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Measurement properties of the Brazilian version of the Kidney Symptom Questionnaire

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SUMMARY

OBJECTIVE: The aim of this study was to measure the reliability, internal consistency, and construct validity of the Kidney Symptom Questionnaire for the Brazilian population.

METHODS: This is a cross-cultural adaptation and questionnaire validation study. We included native Brazilians of both sex aged>18 years, as well as hypertensive and/or diabetic patients. All participants were assessed using Screening for Occult Renal Disease, EuroQol 5 Dimensions, 36-Item Short Form Survey, and the Kidney Symptom Questionnaire. We used Spearman's coefficient (rho) to measure the correlations between the Kidney Symptom Questionnaire and other instruments; Cronbach's alpha to measure internal consistency; and intraclass correlation coefficient, standard error of measurement, and minimum detectable change to measure test-retest reliability.

RESULTS: The sample was formed by 121 adult participants, mostly female, with systemic arterial hypertension and/or diabetes mellitus. We found excellent reliability (intraclass correlation coefficient≥0.978), adequate internal consistency (Cronbach's alpha≥0.860), and adequate construct validity on the Kidney Symptom Questionnaire domains; besides, we observed significant correlations between the Kidney Symptom Questionnaire and other instruments.

CONCLUSION: The Brazilian version of the Kidney Symptom Questionnaire has adequate measurement properties to assess chronic/occult kidney disease in patients who do not require renal replacement therapy.

KEYWORDS: Public health. Diabetes complications. Hypertension. Renal insufficiency, chronic.

INTRODUCTION

Systemic arterial hypertension, one of the most common chronic diseases in the world, is divided into two categories, namely, essential hypertension and secondary hypertension. In essential hypertension, increased sodium absorption by the kidneys and a loss of elasticity in the arteries are associated with an increase in blood pressure, and it is estimated that 95% of cases of systemic arterial hypertension are linked to it. Secondary hypertension, in contrast, occurs as a result of other associated pathologies (e.g., renal dysfunctions), and this category is responsible for 5% of the occurrences[1].

Approximately 600 million people live with systemic arterial hypertension, and approximately 7.1 million die every year. Systemic arterial hypertension is responsible for 13% deaths worldwide, 40% deaths from stroke, and 25% cases of acute myocardial infarction. However, in addition to cerebrovascular conditions, systemic arterial hypertension is also related to chronic kidney disease, whose symptoms (fatigue, weakness, musculoskeletal pain) can be identified even in its early stages[2,3].

Thus, the identification of symptoms related to systemic arterial hypertension in patients is relevant for clinical management and investigation of the general health situation. Therefore, the use of easy-to-use and low-cost tools (e.g., questionnaires) is essential to ensure an assessment that points out potential occult kidney diseases in their primary stages[4]. The questionnaire

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used for this purpose is the Kidney Symptom Questionnaire (KSQ), which was developed in England for patients who do not require renal replacement therapy[4].

The Kidney Symptom Questionnaire consists of 13 items that assess the frequency and severity of symptoms, and besides its easy application, it identifies current renal diseases and points out the probability of pathological evolution[4]. However, the measurement properties of the KSQ have not yet been evaluated in a Brazilian population. Thus, we aimed to measure the reliability, internal consistency, and construct validity of the KSQ for the Brazilian population under the hypothesis that the aforementioned instrument presents adequate measurement properties.

METHODS

Design

This is a cross-cultural adaptation and questionnaire validation study based on the process of cross-cultural adaptation of self-report measures[5] and consensus-based standards for the selection of health measurement instruments[6]. Authorization to validate the instrument was granted via email by one of the authors of the questionnaire (Dr. Alice C. Smith).

Participants and study size

The study was disseminated through social media, websites, email, and mobile messaging apps. In addition, the survey was disseminated to basic health units in the state of Maranhão (northeastern Brazil), and participants were recruited from January 2019 to October 2021.

We collected data through an online form (Google Forms, Mountain View, CA, USA) from people residing in all regions of Brazil. Participants were included in the study after signing or agreeing to an informed consent form. All procedures' research was approved by the Ethics Committee for research with human beings at Universidade Ceuma (opinion number 2.853.570).

A minimum sample size of 100 participants was considered[7], with the following inclusion criteria: native Brazilians, age>18 years, both sex, diagnosed with systemic arterial hypertension and/or diabetes mellitus. We excluded participants who could not understand the questions in the questionnaires and who were in any other situation that made it impossible for them to continue participating in the research.

Data collection

The researchers responsible for the recruitment and assessments did not influence the participants in their respective responses. All participants filled out forms that made it possible to identify clinical and demographic characteristics, in addition to the following instruments: Screening for Occult Renal Disease (SCORED), EuroQol 5 Dimensions (EQ-5D), 36-Item Short Form Survey (SF-36), and Kidney Symptom Questionnaire (KSQ).

Assessment tools

Screening for Occult Renal Disease, an instrument validated for the Brazilian population by Magacho et al.[8] predicts the development of chronic and/or occult kidney disease. It consists of 11 items based on diagnostic characteristics and has a cutoff point of 4 (the total score ranges from 0 to 17). The higher the score, the greater the probability of kidney disease.

EuroQol 5 Dimensions assesses the quality of life through five dimensions, namely, mobility, self-care, usual activities, painful discomfort, and anxiety/depression. It is a simple, short, easy-to-use instrument capable of obtaining psychometric measurements (profile) and econometric index measurements (utility/index); the score ranges from 0 to 5; and the higher values indicate greater negative implications for quality of life[9].

36-Item Short Form Survey, an instrument validated for the Brazilian population by Ciconelli et al.[10] consists of 36 items that assess eight dimensions related to the quality of life: physical functioning, role physical, bodily pain, global health, vitality, social functioning, role emotional, and mental health. The score for each domain ranges from 0 to 100; the higher the score, the higher the quality of life.

Kidney Symptom Questionnaire

The Kidney Symptom Questionnaire, a questionnaire developed by Smith et al., at Lancaster University in 2018, has 2 domains (frequency and impact of symptoms), each with 13 items. For each item, there are five response options, generating a score from 0 to 4. For the total score by domain, the scores of each item must be added, generating a value that varies from 0 to 52[4]. Higher values indicate greater frequency/impact of symptoms.

Statistical analysis

We verified the distribution of variables through the Kolmogorov-Smirnov test. We used Spearman's correlation coefficient to verify associations between the KSQ domains and other instruments (SCORED, EQ-5D, SF-36), and the values for correlation magnitudes are 0.26–0.49=low, 0.50–0.69=moderate, 0.70–0.89=high, and 0.90–1.00=very high[11].

We used Cronbach's alpha to assess internal consistency (considered adequate when obtaining values between 0.70 and

0.95)[7]. Test-retest reliability was evaluated by intraclass correlation coefficient (ICC), standard error of measurement (SEM), and minimum detectable change (MDC). The mathematical equation to calculate SEM is Standard deviation×√(1-ICC). The mathematical equation to calculate MDC is 1.96×SEM×√2[12].

The interpretation of the ICC is in accordance with Fleiss' classification[13]: <0.40=low; 0.40–0.75=moderate; 0.75–0.90=substantial; and >0.90=excellent. We evaluated the construct validity by comparing the KSQ and other instruments already validated for the Brazilian population (i.e., SCORED, EQ-5D-3L, SF-36). We expect correlations greater than 0.30 between the instruments. We set the significance level at 5% for all statistical tests, which were processed using the Statistical Package for the Social Sciences software, version 17.0 (Chicago, IL, USA).

RESULTS

A total of 128 volunteers were recruited for the study, of whom 7 were excluded based on the eligibility criteria; thus, the final sample consisted of 121 adult participants, mostly female, with systemic arterial hypertension and/or diabetes mellitus. To assess the reliability and internal consistency of the KSQ, 65 volunteers participated in the survey for the second time after 7 days.

Table 1 describes the anthropometric and clinical characteristics of the study participants. Table 2 shows excellent reliability (ICC≥0.978) and adequate internal consistency (Cronbach's alpha≥0.860) for the KSQ domains. Table 3 shows the correlations between the KSQ and other instruments (SCORED, EQ-5D-3L, and SF-36). We observed significant ($p<0.05$) and adequate values for the construct validity of the KSQ based on confirmation of the previous hypothesis.

Ceiling and floor effects were not observed for the KSQ. For the frequency of symptoms domain, 5 (4.1%) participants had a score of 0, while 17 (14%) participants had a score of 0 for the impact of symptoms domain. The maximum KSQ score was not reached by any participant. The instrument is available at the link: https://questionariosbrasil.blogspot.com.

DISCUSSION

The results of the KSQ in the present study describe excellent test-retest reliability, adequate internal consistency, convergent validity with other instruments for screening for kidney disease, and an assessment of the quality of life and stability among the responses of all volunteers.

Our analyses reinforce the findings of Brown et al.[4] whose descriptions support this instrument to support regular measurements of symptoms in routine clinical practice; it can also be used as a resource to improve and develop effective future treatments and management in patients with chronic or occult kidney disease through the assessment of symptoms and their respective frequencies.

It seems common to describe that aging is positively related to chronic or occult kidney disease; although an important clinical observation, this may just be a confounding variable

Table 1. Characteristics of the study participants (n=121).

Variables	Values
Sex (female)[b]	71 (58.7%)
Schooling[b]	
Primary school	28 (23.1%)
High school	29 (24%)
University education	64 (52.9%)
Marital status[b]	
Single	35 (28.9%)
Married or stable union	75 (62%)
Divorced	3 (2.5%)
Widower	8 (6.6%)
Age (years)[a]	47.14 (16.81)
Stature (m)[a]	1.65 (0.09)
Body mass (kg)[a]	75.36 (18.79)
Body mass index (kg/m²)[a]	27.45 (5.60)
Physical activity (yes)[b]	51 (42.1%)
Systemic arterial hypertension (yes)[b]	73 (60.3%)
Diabetes mellitus (yes)[b]	51 (42.1%)
SCORED (score, 0–17)[a]	4.16 (2.47)
EQ-5D (score)[a]	0.82 (0.16)
SF-36 (score)[a]	
Physical function (0–100)	70.08 (29.16)
Role physical (0–100)	60.53 (42.17)
Pain (0–100)	65.90 (22.55)
Global health (0–100)	58.18 (24.53)
Vitality (0–100)	57.43 (22.63)
Social function (0–100)	73.55 (24.69)
Role emotional (0–100)	58.40 (42.87)
Mental health (0–100)	65.38 (22.05)
KSQ (score)[a]	
Symptoms frequency (0–52)	13.91 (10.01)
Symptoms impact (0–52)	12.25 (11.45)

SCORED: Screening for Occult Renal Disease; EQ-5D: EuroQol 5 Dimensions; SF-36: 36-Item Short Form Survey; KSQ: Kidney Symptom Questionnaire. [a]Values are presented as mean (standard deviation). [b]Values are presented as absolute numbers (percentage).

Table 2. Reliability (test-retest) and internal consistency of the Kidney Symptom Questionnaire (n=65).

Domain	ICC	(95%CI)	SEM (score)	SEM (%)	MDC (score)	MDC (%)	Cronbach's alpha
Frequency	0.978	0.964; 0.987	1.59	9.05	4.41	25.09	0.860
Impact	0.985	0.975; 0.991	1.88	10.95	5.20	30.36	0.911

CCI: intraclass correlation coefficient; CI: confidence interval; SEM: standard error of measurement; MDC: minimum detectable change.

Table 3. Correlation between the Kidney Symptom Questionnaire and other instruments (n=121).

Variables	KSQ	
	Symptoms frequency	Symptoms impact
SCORED	rho=0.466, p<0.001*	rho=0.444, p<0.001*
EQ-5D	rho=-0.759, p<0.001*	rho=-0.689, p<0.001*
SF-36		
Functional capacity	rho=-0.691, p<0.001*	rho=-0.642, p<0.001*
Role physical	rho=-0.457, p<0.001*	rho=-0.456, p<0.001*
Pain	rho=-0.650, p<0.001*	rho=-0.632, p<0.001*
Global health	rho=-0.652, p<0.001*	rho=-0.579, p<0.001*
Vitality	rho=-0.735, p<0.001*	rho=-0.592, p<0.001*
Social function	rho=-0.626, p<0.001*	rho=-0.564, p<0.001*
Role emotional	rho=-0.549, p<0.001*	rho=-0.532, p<0.001*
Mental health	rho=-0.575, p<0.001*	rho=-0.459, p<0.001*

KSQ: Kidney Symptom Questionnaire; SCORED: Screening for Occult Renal Disease; EQ-5D: EuroQol 5 Dimensions; SF-36: 36-Item Short Form Survey. *Significant correlation (p-value<0.05) – Spearman's correlation coefficient (rho).

(i.e., it is associated with the disease but does not explain the chronification). Our study permeates this aspect by identifying that the participants have a mean age>40 years; however, they have other associated diseases, such as systemic arterial hypertension and diabetes mellitus, which are more related to chronic/occult kidney disease.

In this scenario, in a systematic review, Ameh et al.[14] described an association between the presence of chronic kidney disease (or declining kidney function) and accelerated wear of telomeres and also mainly highlighted the confounding effect of the aging process on the assessment of kidney symptoms.

The relevance of this study consists of its applicability in clinical and scientific contexts. In primary health care (clinical context), it allows us to screen for potential occult kidney diseases in patients with systemic arterial hypertension and/or diabetes mellitus, making it possible, in necessary cases, to refer them to specialists or perform additional tests, in order to promote, protect, or restore the health of these people. In epidemiological studies (scientific context), it facilitates the assessment of the general state of health for comparisons with other populations also studied.

This study has limitations that must be described. First, the absence of other studies that carried out a similar adaptation made it difficult to construct the discussion in question. In addition, the construction of the database took place through online forms, and we know that not all regions of Brazil participated in this research. Thus, considering the cultural plurality of Brazil, we suggest additional studies for the applicability of this tool in different states of the country in order to confirm the reproducibility of our findings.

Clinical implications

The implementation of a questionnaire that uses the patient's self-report (e.g., the KSQ) to then consider the intervention helps teamwork, communication, and relationships, as well as support for families, consequently improving patient care in health promotion, protection, and recovery environments.

CONCLUSION

The Brazilian version of the KSQ has adequate measurement properties to assess chronic/hidden kidney disease in patients who do not require renal replacement therapy.

ETHICS APPROVAL

The study followed the Declaration of Helsinki guidelines, and all procedures of this study were previously approved by the Ethics Committee in research with human beings at the CEUMA University in Brazil, attending the resolution 466/2012 (opinion number 2.853.570).

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author, but access to these data is restricted because they were used under license for the current study and are thus not publicly available. However, data can be obtained from the authors upon reasonable request and with the permission of the corresponding author.

AUTHORS' CONTRIBUTIONS

LFSA: Data curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **APS:** Data curation, Formal Analysis, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. **RGM:** Data curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **CDS:** Data curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **WSB:** Data curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **JAOB:** Data curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **MCG:** Data curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **AVDF:** Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **DBD:** Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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